product description
hp vectra xe320

technical
reference
manual

hp desktop pcs

www.hp.com/go/vectrasupport

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Information Roadmap

Use the ⚌ icon in Acrobat Reader to search for information in this PDF.

The following types of information are available for HP Business PCs:

Technical Reference

See the *HP Technical Reference Manuals*.

This *Technical Reference Manual* is a technical reference and BIOS document for personnel providing system level support. It is available in PDF format on the HP support web site
(**www.hp.com/go/vectrasupport** or **www.hp.com/go/e-pcsupport**).
It is presented in modular form to provide quick and easy access to technical information on the HP Business PC. It is made up of the following components:

- The *Introduction & HP Business PC Overview* provides a quick reference guide to the hardware components and BIOS used in the latest HP Business PCs. It also lists some of the available accessories.

- *Product Description* (this document). Provides technical information specific to a HP Business PC. This includes summary information on product hardware and detailed information on the BIOS. Read this manual to see which hardware components are in the PC.

- *HP Business PC Technology*. Provides an in-depth guide to the hardware in all of the featured HP Business PCs. Subjects covered include chipsets, processors, graphics controllers, hard disk drives and optical drives.

Installing, Configuring and Upgrading

See the *HP Upgrade Guide* or the *HP Service Handbook Chapter* .

The *Upgrade Guide* will help you upgrade and replace components in your HP Business PC, including the hard drive, memory, battery, power supply, and optical drives. More information is available on the HP support web site (**www.hp.com/go/vectrasupport**).

The *Service Handbook Chapter*, available in PDF format on the HP support web site
(**www.hp.com/go/vectrasupport** or **www.hp.com/go/e-pcsupport**), provides information on:

- HP Business PC configurations

- Replacement parts

- Available accessories.

Troubleshooting

See the *HP Troubleshooting Guide*.

The *Troubleshooting Guide*, available in PDF format on the HP support web site
(**www.hp.com/go/vectrasupport** or **www.hp.com/go/e-pcsupport**) will help you:

- Troubleshoot your HP Business PC

- Find out where to get more information.

Discover and use your product

See the *HP Quick Start* card and *HP Quick User's Guide*.

The *Quick Start* card provided with your HP Business PC will help you:

- Set up and begin using your HP Business PC for the first time

- Upgrade and replace components in your HP Business PC, including the hard drive, processor memory, add-on cards and optical drives. More information is available on the HP support web site (**www.hp.com/go/vectrasupport** or **www.hp.com/go/e-pcsupport**).

- Find out where to get more information.

The *Quick User's Guide* provided with your HP Business PC includes basic troubleshooting information, technical specifications, warranty and legal information.

Your computer's online information

Your computer may contain online help information on the hard disk. It includes information on:

- Troubleshooting and how to use HP Instant Support

- Linking to useful HP web sites.

Information on the hp support web site

Refer to the HP support web site (**www.hp.com/go/vectrasupport** or **www.hp.com/go/e-pcsupport**) for a wide range of information, including:

- Downloadable documentation

- Service and support options

- The latest BIOS, drivers and utilities

- Answers to Frequently Asked Questions.

System recovery cd-roms

Used for a full system recovery or alternative OS installation. Includes instructions on how to recover your preloaded software including operating system, drivers and utilities.

Finding Information

Use the following table to determine where to locate particular types of information:

Type of Information	Location
• Support phone numbers • Technical support contact information • Warranty information	*Quick User's Guide*
• How to set up your computer	*Quick Start Card* (details) *Quick User's Guide* (general information)
• Operation of your computer	Operating system and application manuals
• Diagrams and detailed instructions on installing add-on devices • Internal wire connections for adding hard drives, CD-ROM, etc. • Memory expansion and replacing devices	*Upgrade Guide* (desktop PCs only)
• Identifying the problem • Information on errors • Problem solving • Troubleshooting	*Troubleshooting Guide*
• Parts list • Accessories list	*Service Handbook Chapter*
• BIOS • Connectors • LAN controller • IRQ • POST setup • Specifications • System board layout • Technical diagrams	*Technical Reference Manual* (this document)

Bibliography

Datasheets and other information can be obtained at:

❒ *Intel Chipsets*
   developer.intel.com

❒ *Pentium 4 Processors*
   www.intel.com/pentium4

❒ *Analog Devices AD1885*
   www.analogdevices.com

❒ *Intel LAN card*
   www.intel.com/support/network

❒ *ATI Rage 128 Pro graphic card*
   www.ati.com

❒ *NVIDIA graphic cards*
   www.nvidia.com

❒ Hewlett-Packard white papers are available on a variety of subjects including AGP graphics and SDRAM memory at:
   www.hp.com/go/library

Table of Contents

BIOS Overview

Drivers and Software

System Overview

This chapter introduces the internal and external features, and lists the specifications of HP Vectra XE320 PCs.

Package Features

Front Panel

Optical disk activity
light (green)

Floppy disk activity
light (red)

Power on status light
(green)

On/Off power
button

Hard disk drive activity
light (yellow)

Rear Connectors

Voltage switch

Power connector

Mouse

Keyboard

25-pin Parallel Connector

Serial Connectors

Line Out

Line In

Microphone

Network (LAN) connector

2 USB Connectors

Monitor Connector

Inside the Computer

Processor

CD-ROM, CD-RW drive, or DVD drive

Power supply

Floppy disk drive

Hard disk drive

Main memory

Accessory board slots

Note: Hard disk and floppy disk cables have been removed for picture clarity

Specifications

Physical Characteristics

Vectra XE320 Characteristics	
Weight (configuration with 1 CD-ROM drive, excluding keyboard and display)	10 kilograms (22 pounds)
Dimensions	38.0 cm (Depth) by 21.0 cm (Width) by 39.0 cm (Height)
	(14.96 inches by 8.27 inches by 15.35 inches)
Footprint	0.068 m^2 (0.73 sq ft)
Acoustic noise emission (ISO 7779)	Sound pressure level at operator position
Operating (idle)	LpA $\leq$ 35 dBA
Power Supply	
Input voltage (voltage selection switch):	100-127 V 6A max, 200-240 V 3A max
Input frequency:	50/60Hz
Power consumption (115 / 60Hz and 230 / 50 Hz)	Windows XP
Max operating	110W
Idle (typical)	45W
Suspend	$\leq$ 4W
Off	$\leq$ 4W

NOTE   The power consumption and acoustics figures given in the table above are valid for the standard configuration as shipped. For more information, refer to the product's data sheet at HP's web site: `www.hp.com/desktops`.
When the computer is turned off with the power button on the front panel, the power consumption falls below 10W, but it is not zero. The special on/off method used by this computers considerably extends the lifetime of the power supply. To reach zero power consumption in "off" mode, either unplug the power outlet or use a power block with a switch.

Environmental Specifications

Environmental Specifications (System Processing Unit, with Hard Disk)	
Operating Temperature	+10°C to +35°C (+50°F to 95°F)
Storage Temperature	-40°F to +70°F (-40°C to +158°C)
Operating Humidity	15% to 80% (relative)
Storage Humidity	8% to 85% (relative), non-condensing at 40°C (104°F)
Operating Altitude	10000ft (3100m) max
Storage Altitude	15000ft (4600m) max

NOTE   Operating temperature and humidity ranges may vary depending on the mass storage devices installed. High humidity levels can cause improper operation of disk drives. Low humidity ranges can aggravate static electricity problems and cause excessive wear of the disk surface.

2

System Features

This chapter describes core components of HP Vectra XE320 PCs such as processors, chipsets, mass storage devices, graphics controllers, audio controllers, network features and input devices.

XE320 System Board Layout

The *HP Vectra XE320 PC* system board features a Socket 478B for a Pentium 4 processor, three DIMM main memory slots, three PCI slots and one AGP slot.
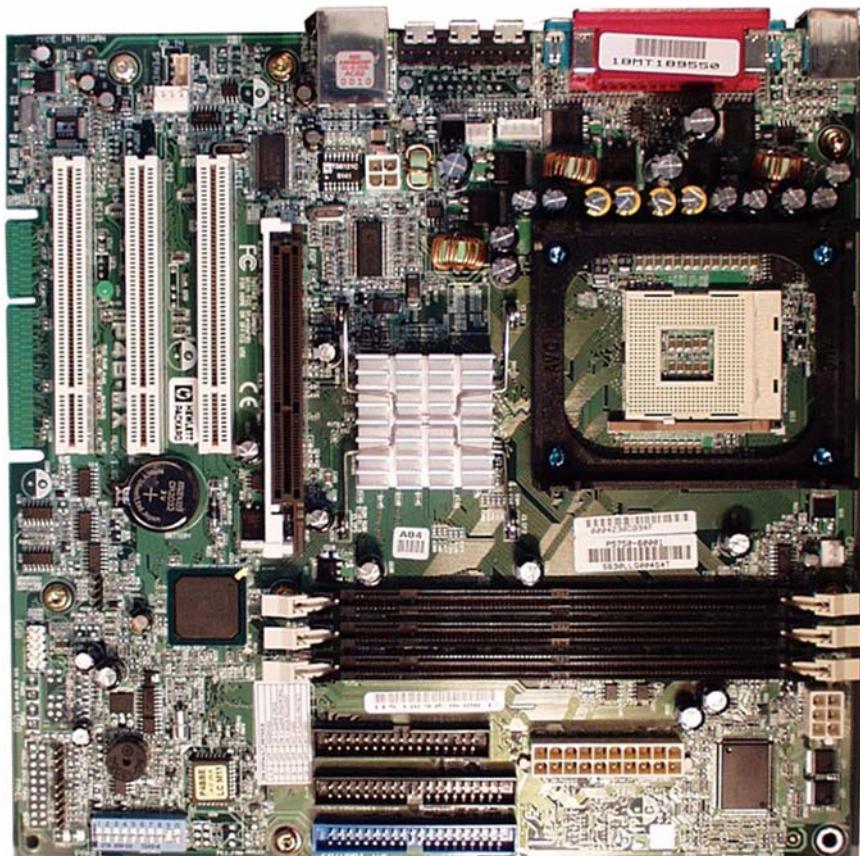
System Board Components

The following diagram shows where the different slots and connectors are located on the system board:
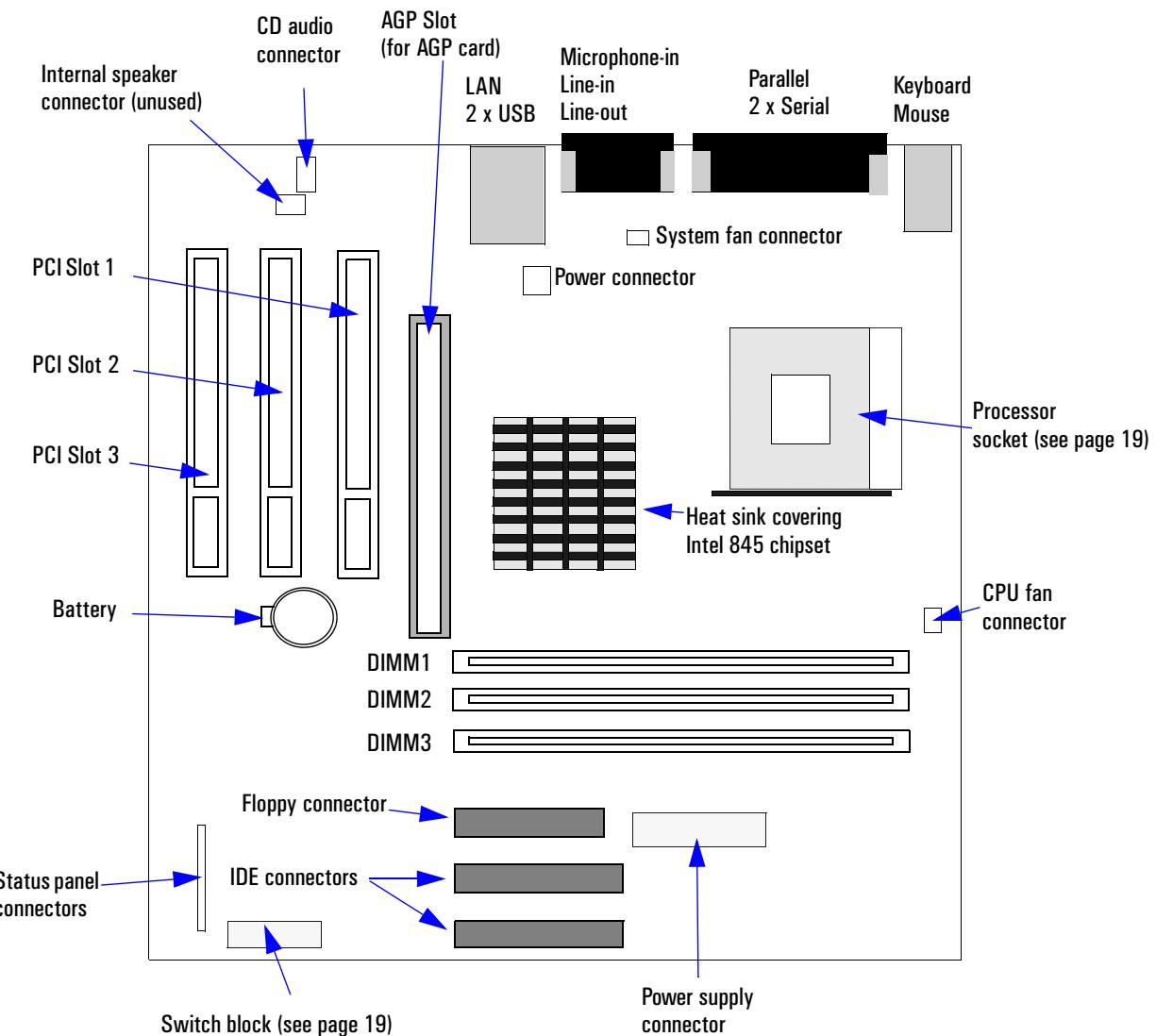
WARNING   There is a risk of explosion if the battery is not replaced by the correct type. Make sure you dispose of used batteries according to instructions provided.

Architectural View

The following diagram shows the XE320 Intel 845 Chip architecture:

```
                         ┌──────────────────────┐
                         │  Pentium 4 processor │
                         └──────────────────────┘
                                    ↕
                            System Bus 3.2GB/s

                                              Memory Bus
┌────────────────┐   ┌──────┐   ┌──────────┐          ┌──────────────────┐
│ AGP graphics   │←→ │ AGP  │←→ │ Intel 845│  ←──────→ │ Main Memory      │
│ card           │   │ Slot │   │          │          │ 133MHz SDRAM     │
└────────────────┘   └──────┘   └──────────┘          └──────────────────┘
                     AGP 4X
                     1066MB/s
                                     ↕
    Hard Disk                 ┌──────────┐
       ⊖ ───────────────────  │ ICH2 chip│ ←──→ ◯
                              │          │            2 USB Ports
                              │          │ ←──→ ◯
                              │          │                       3 PCI Slots
       ⊖ ───────────────────  │          │                        ▯▯▯
    Optical drive             └──────────┘           PCI Bus

   ┌──────────┐   ┌──────────┐ ┌──────────┐  ┌─────────────────────────┐
   │ Audio    │   │ Super I/O│ │Flash BIOS│  │ Integrated Intel Pro/100│
   │ AD1885   │   └──────────┘ └──────────┘  │ VE Network Adapter      │
   └──────────┘                              │ (10 Base-T/100 Base-TX  │
                  Serial/Parallel/FDD/PS2    │ LAN Interface)          │
                                             └─────────────────────────┘
```
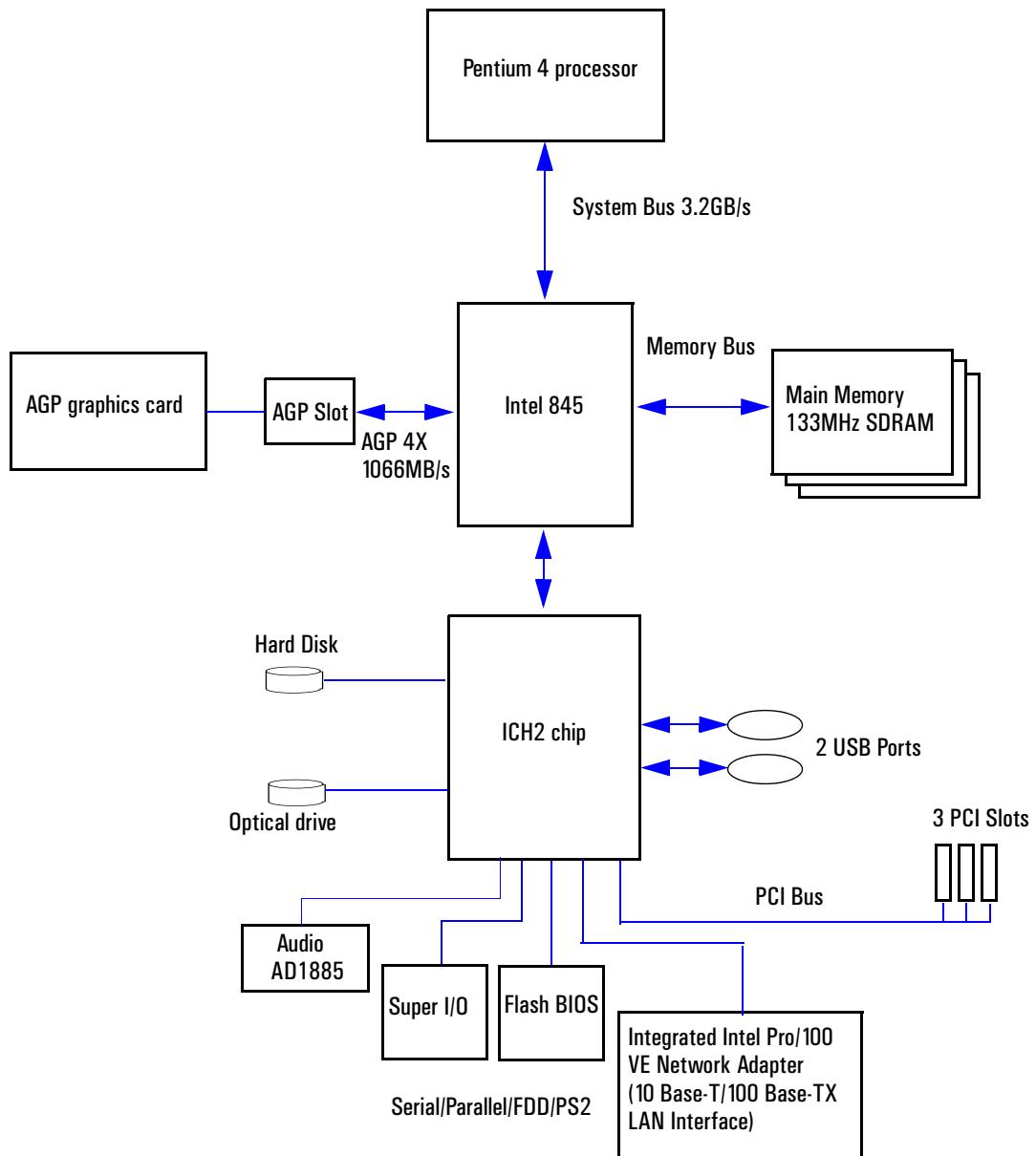
Main Memory
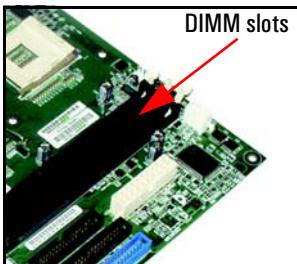
DIMM slots

There are three 168-pin DIMM slots on the system board for installing main memory. You can install 133MHz SDRAM modules, these are available in 128, 256 and 512MB memory modules. 64MB memory modules are not supported. You can install a maximum of 1.5GB (3 x 512MB modules).

You can only use non-ECC memory modules.

Processors

478B PGA Socket
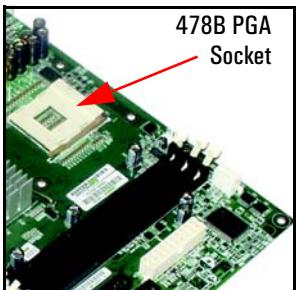
The XE320 is equipped with a socket 478B Intel Pentium 4 processor. The processor is connected to the system board through a Pin Grid Array (PGA) 478B Socket.

A heatsink and fan (not shown) cover the processor to prevent it from overheating.

To find out more about Pentium 4 technology, refer to the *Technical Reference Manual - HP Business PC Technology*.

System Board Switches

System Board switches
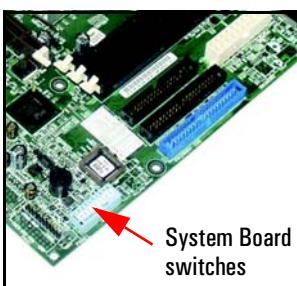
The following table gives the functionality and default position of switches on the system board switch block:

Switch	Default Position	Function
1-4	OFF	Reserved
5	OFF	ON = Clear CMOS
6	OFF	ON = Clear Password
7	OFF	ON = BIOS crisis mode recovery
8	OFF	Not used
9	ON	OFF = Boot block FLASH protect
10	OFF	Not used

Accessory Board Slots
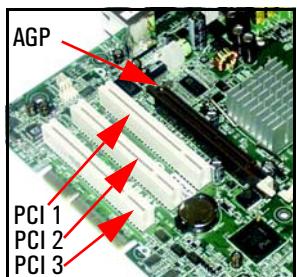
The XE320 has four accessory board slots: three PCI slots and one 1.5V AGP slot.

The PCI slots are PCI 2.2 compliant and each slot supports a maximum total current of 375 mA.

Your graphics card is installed in the AGP slot. The 1.5V AGP slot is backward compatible with AGP 1x, 2x and 4x modes. A latch on one end of the AGP slot locks the graphics card in place.

PCI Slot Numbers

Your PC uses logical slot numbers in the BIOS *Setup* program. You need to know these logical slot numbers if you want to change the PCI slot configuration in the *Setup* program.

XE320 PCI Mapping Table			
Bus	**Device**	**PCI Device**	**Slot#**
0	0	MCH: Host bridge	
0	2	MCH: AGP bridge	
0	30	ICH: Hub interface to PCI bridge	
0	31	ICH: PCI to LPC bridge	
0	31	ICH: IDE controller	
0	31	ICH: USB controller	
0	31	ICH: SMBUS controller	
0	31	ICH: AC97 audio controller	
2	9	PCI slot 1	1
2	10	PCI slot 2	2
2	11	PCI slot 3	3
1	0	AGP device	AGP slot
1	8	LAN controller	Embedded

Mass Storage Devices

Hard Disk Drives

A 3.5-inch hard disk drive is supplied on an internal shelf in some models. These hard drives can be provided with the PC. To see which other hard disk drives can be purchased as accessories for the XE320, refer to **www.hp.com/desktops/products/accessories**.

	20GB Ultra-ATA 100	40GB Ultra-ATA 100
Average Seek Time (ms)	8.9 to 12.1	
Track-to-Track Seek TIme (ms)	1.5	
Full Stroke Seek Time (ms)	20 to 25	
Rotational Speed (RPM)	5400	
Buffer Size (MB)	2	

To find out about Ultra-ATA 100 hard disk drive technology, refer to the *Technical Reference Manual - HP Business PC Technology.*

Floppy Disk Drives

All models are supplied with a 3.5-inch floppy disk drive.

Optical Drives

Models may be fitted with a 48X Max-speed IDE CD-ROM drive. This drive can play standard CD-ROM discs, conforming to optical and mechanical standards as specified in the Red and Yellow Book. This drive can also be purchased as an accessory. Refer to:
www.hp.com/desktops/products/accessories.

To find out about CD-ROM and DVD drive technology, refer to the *Technical Reference Manual - HP Business PC Technology.*

Features of the CD-ROM Drive (48X)

	Description
Supported formats	- CD-ROM Mode-1 data disc
	- CD-ROM Mode-2 data disc (Mode 1 and Mode 2)
	- Photo-CD Multisession
	- CD Audio disc
	- Mixed mode CD-ROM disc (data and audio)
	- CD-ROM XA
	- CD-I
	- CD-Extra
	- CD-R
	- CD-RW
Disc Diameter	120 mm
Data Block Size	2,055 bytes (14X, Mode-1)
	4,800 bytes (32X, Mode-2)
Storage Capacity	650MB (Mode-1)
	742MB (Mode-2)
Sustained Transfer Rate	Outerside: 7.2MB/s Max (48X)
Burst Transfer Rate	PIO mode 4: 16.6 MB/s maximum
	Single Word DMA Mode 2: 8.3MB/s maximum
	Multi Word DMA Mode 2: 16.6MB/s maximum.
Access Time	Average Stroke (1 / 3 stroke): 110ms (typical)
	Full Stroke: 180ms (typical)
Buffer Memory Size	128KB
Rotational speed	Approx. 11,100 rpm maximum

Features of the CD-RW Drive (24X/10X/40X)

	Description
Supported formats	- CD-DA
	- CD-ROM (Mode-1)
	- CD-ROM XA (Mode-2 Form-1 and Form-2)
	- CD-I Ready
	- Video CD (MPEG-1)
	- Enhanced Music CD
	- CD extra
	- I-Trax CD
	- Photo CD
Disc Diameter	120mm
Data Block Size	2,048 bytes (Mode-1 and Mode-2 Form-1)
	2,336 bytes (Mode-2)
	2,328 bytes (Mode-2 Form-2)
Interface	IDE/ATA-2 MMC Compliant
Sustained Data Transfer Rate	CAV Reading: 40X: 6MB/s maximum
	CLV Re-writing: 10X: 1.5MB/s maximum
	Zone CLV Writing: 24X: 3.6MB/s maximum
Burst Transfer Rate	PIO mode 4: 16.6 MBs/s maximum
	UDMA Mode 2: 33.3MB/s maximum
	DMA Mode 2: 16.6MB/s maximum.
Access Time	Full Stroke: 180 ms (typical)
Buffer Memory Size	2MB
Rotational Speed	Variable (approx. 8,400 rpm maximum)

Features of the DVD-ROM Drive (16X/40X)

	Description
Supported formats	- CD-ROM Mode-1 data disc
	- CD-ROM Mode-2 data disc (Mode 1 and Mode 2)
	- Photo-CD Singlesession and Multisession
	- CD Audio disc
	- Video CD
	- Mixed mode CD-ROM disc (data and audio)
	- CD-ROM XA
	- CD-I
	- CD-Extra
	- CD-R
	- CD-RW
	- CD Text
	- DVD-ROM
	- DVD+ RW
	- DVD-R
	- DVD-RW
Disc Diameter	120mm
Storage Capacity	656MB to 18GB (depending on disk type)
Read Mode	16X max (DVD), 40X max CD-ROM
Burst Transfer Rate	PIO mode 4: 16.6MB/s maximum
	Single Word DMA Mode 2: 8.3MB/s maximum
	Multi Word DMA Mode 2: 16.6MB/s maximum
	Ultra DMA 33: 33.3MB/s maximum
Access Time	CDs - Average Random Access Time: 90ms (typical)
	Full Stroke Access Time: 160ms (typical)
	DVDs - Average Random Access Time: 120ms (typical)
	Full Stroke Access Time: 180ms (typical)
Buffer Memory Size	512KB
Rotational speed	Approx. 7,300 rpm maximum

NOTE   If a disk is still in the drive after power failure or drive failure, the disk can be reclaimed by inserting a straightened paper-clip into the small hole at the bottom of the door.

DVD Region Codes

After setting the DVD region (by playing a DVD video for the first time), the DVD region can be changed a further four times; after that the DVD drive will only play DVD videos from the last DVD region that was set.

Regional Codes	Region
1	USA & Canada
2	Europe (excluding former USSR countries), Japan, Near East (including Iran and Egypt), South Africa
3	South East Asia, South Korea
4	Latin America & Oceania (Australia, New Zealand)
5	Africa (excluding Egypt and South Africa), Eastern European countries, Sub-Indian continent
6	China

Graphics

The XE320 offers a choice of graphics solutions:

- Nvidia TNT2 Vanta graphics card
- ATI Rage 128 Pro graphics card.

Nvidia TNT2 Vanta Graphics Card

Some Vectra XE320 PC models are supplied with an Nvidia TNT2 Vanta graphics card.

For more information, refer to the *Technical Reference Manual - HP Business PC Technology* available in PDF (Acrobat) format from **www.hp.com/go/vectrasupport**.

Key Features

- 16MB 7ns 64-bit SDRAM memory (125MHz clock, 1.0GB/sec bandwidth)
- 300MHz RAMDAC built in
- AGP 2X
- PC 99 DB-15 analog monitor connector (VESA DDC2B + DPMS)
- Cooled by heat sink only
- Full hardware triangle setup
- 200 Million pixels per second
- 5 Million triangles per second.

ATI Rage 128 Pro Graphics Card

Some Vectra XE320 PC models are supplied with an ATI Rage 128 Pro graphics card. The ATI Rage 128 Pro supplied with the XE320 comes with 16MB (Brazil only) or 32MB of graphics memory.

For more information, refer to the *Technical Reference Manual - HP Business PC Technology* available in PDF (Acrobat) format from **www.hp.com/go/vectrasupport**.

Key Features

- Powered by ATI Rage 128 Pro chip
- Full AGP 2X/AGP 4X support (up to 1GB/s bandwidth)
- 128bit 2D engine
- Floating-point 3D setup engine with complete 3D primitive support
- High Quality DVD/MPEG2 playback with iDCT and motion compensation support
- DirectX 8 and OpenGL hardware acceleration
- Integrated triple 8-bit palette 250MHz RAMDAC with video gamma adjustment
- DDC2B support for Plug-&-Play detection of monitor
- 16/10 monitor support
- Support for 32-bit true color (16.7 million colors) at resolutions up to 1920x1440
- Twin-Cache architecture to maximize texture and pixel throughput.

Audio

The audio solution on the XE320 is the Analog Devices AD1885 integrated AC'97 audio solution. The AD1885 interfaces directly with the South Bridge chip and performs all digital operations, such as sample rate conversions and synthesis, as well as mixing and processing the analog signals.

All models have a Line In jack, Line Out jack and Microphone In jack connector located on the rear panel. These external jacks are standard connectors.

Line out / speaker connector   Line in connector   Microphone connector
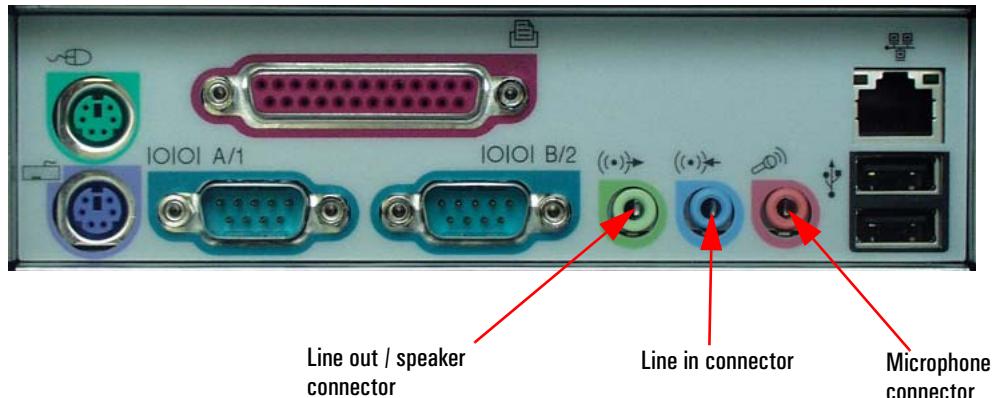
For more information on AD1885 audio technology refer to the *Technical Reference Manual - HP Business PC Technology.*

Adding an Audio Accessory Board

The integrated PCI audio can be disabled in the **Advanced** menu of the *Setup* program, if an audio accessory board is installed.

Network

All models have an Integrated Intel Pro/100 VE Network Adapter (10 Base-T/100 Base-TX LAN Interface).

The Intel LAN boot ROM setup can be launched by pressing **CTRL-S** while booting your PC.

LAN Connector

The 10 Base-T/100 Base-TX LAN connector is located on the rear of the PC.
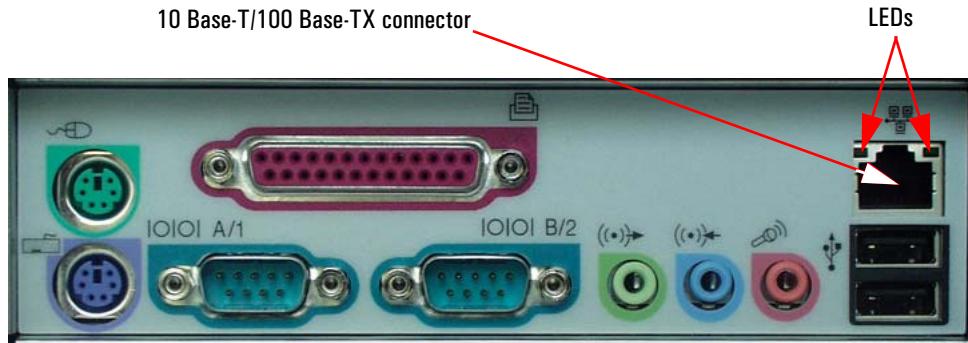
There are two LEDs on the 10 Base-T/100 Base-TX connector as indicated in the graphic above. The following table provides a status summary of these LEDs:

LED	Description	Status		
		Flashing	**On**	**Off**
Green	Speed LED	N/A	100 Base-TX connection between NIC and hub	10 Base-T connection between NIC and hub
Yellow	Link Integrity and Activity LED	Link integrity OK and network traffic present	Link integrity OK and no network traffic	No connection between NIC and hub

For more information on network technology, refer to the *Technical Reference Manual - HP Business PC Technology.*

BIOS Overview

This chapter describes the BIOS features for HP Vectra XE320 PCs.

BIOS Summary

HP Vectra XE320 PCs contain an American Megatrends Inc. BIOS (Basic Input Output System). The system ROM contains the POST (power-on self-test) routines, and the BIOS: the System BIOS, video BIOS, and Intel LAN boot ROM.

The system BIOS is identified by the version number JN.xx.yy. The latest BIOS version for your HP XE320 PC and instructions for updating the BIOS can be downloaded from HP's Support Web site at: **www.hp.com/go/vectrasupport**

This section covers:

- The BIOS Setup program
- Power saving
- BIOS addresses
- POST tests
- Beep codes.

Using the HP Setup Program

Entering the Setup Program

1 Restart the computer.

2 Press **F8** at power on to enter the Boot menu.

3 In the Boot menu press **F2** to enter the *Setup* program.

Entering the Summary Screen

The summary screen shows the computer's configuration, with information such as processor speed, memory size, and BIOS version. To enter the summary screen:

1 Restart the computer.

2 Press **Esc** at power on, the summary screen appears momentarily, press **Pause** to keep it displayed.

Setup Program Menus

The *Setup* screen comprises five menus: **Main**, **Advanced**, **Security**, **Boot** and **Exit**. These are selected using the left and right arrow keys.

A brief summary of what settings can be configured in each of these menus is described below:

Main Menu

In the **Main** menu you can select whether or not your plug and play operating system configures non-bootable devices. In the **Main** menu you can also reset your configuration data, set your system time and date, and specify your keyboard settings.

Advanced Menu

The **Advanced** menu allows you to configure the setting of all motherboard components such as IDE devices, LAN, audio and I/O ports.

Security Menu

In the **Security** menu you can configure your password settings.

Boot Menu

In the **Boot** menu you can change your boot settings, including enabling/disabling quickboot mode.

Exit Menu

The **Exit** menu allows you to exit the BIOS setup utility with or without saving your setup changes, it also allows you to exit while restoring the setup default settings.

Power Saving

You can reduce the PC's overall power consumption by using Power Management to slow down the PC's activity when it is idle.

ACPI Power Management Modes (Windows 2000 and Windows XP)

- Idle (s1):
  The processor is shut down.

- Standby (s3):
  All components of the system are shut down except for the system memory which remains active.

- Hibernation (s4):
  System memory is copied to the hard disk. All components of the system are shut down.

- Off (s5):
  All components of the system are shut down.

BIOS Addresses

This section provides a summary of the main features of the HP system BIOS.

System Memory Map

Reserved memory used by accessory boards must be located in the area from C8000h to EFFFFh.

0000 0000 - 0000 03FF	Real-mode IDT
0000 0400 - 0000 04FF	BIOS Data Area
0000 0500 - 0009 FC00	Used by OS
0009 FC00 - 0009 FFFF	Extended BIOS Data Area
000A_0000 - 000B_FFFF	Video RAM or SMRAM (not visible unless in SMM)
000C 0000 - 000C 7FFF	Video ROM
000C 8000 - 000E 0000	Adapter ROM, RAM, memory-mapped registers
000E 0000 - 000F FFFF	System BIOS (Flash/Shadow)
10 0000 - FF FFFF	Memory (1MB to 16MB)
100 0000 - 1FF FFFF	Memory (16MB to 32MB)
200 0000 -3FF FFFF	Memory (32MB to 64MB)
400 0000 -1FFF FFFF	Memory (64MB to 1.5GB)[1]
FFF80000 - FFFF FFFF	512KB BIOS (Flash)

1.The last MB of memory in this area is used as Unified Memory Architecture (UMA) embedded memory.

HP I/O Port Map (I/O Addresses Used by the System)

Peripheral devices, accessory devices and system controllers are accessed via the system I/O space, which is not located in system memory space. The 64KB of addressable I/O space comprises 8-bit and 16-bit registers (called I/O ports) located in the various system components. When installing an accessory board, ensure that the I/O address space selected is in the free area of the space reserved for accessory boards (100h to 3FFh).

Although the *Setup* program can be used to change some of the settings, the following address map is not completely BIOS dependent, but is determined partly by the operating system. Note that some of the I/O addresses are allocated dynamically.

I/O Address Ports	Function
0000 - 000F	DMA controller 1
0020 - 0021	Master interrupt controller (8259)
002E - 002F	NS360 Configuration registers
0040 - 0043	Timer 1
0060, 0064	Keyboard controller (reset, slow A20)
0061	Port B (speaker, NMI status and control)
0070	Bit 7: NMI mask register
0070 - 0071	RTC and CMOS data
0080	Manufacturing port (POST card)
0081 - 0083, 008F	DMA low page register
0092	PS/2 reset and Fast A20
00A0 - 00A1	Slave interrupt controller
00C0 - 00DF	DMA controller 2
00F0 - 00FF	Co-processor error
0170 - 0177	IDE secondary channel
01F0 - 01F7	IDE primary channel
0278 - 027F	LPT 2
02E8 - 02EF	Serial port 4 (COM4)
02F8 - 02FF	Serial port 2 (COM2)
0372 - 0377	IDE secondary channel, secondary floppy disk drive
0378 - 037A	LPT1
03B0 - 03DF	VGA
03E8 - 03EF	COM3
03F0h- 03F5	Floppy disk drive controller
03F6	IDE primary channel
03F7	Floppy disk drive controller
03F8 - 03FF	COM1
04D0 - 04D1	Interrupt edge/level control
0678 - 067B	LPT2 ECP
0778 - 077B	LPT1 ECP
0CF8 - 0CFF	PCI configuration space

DMA Channel Controllers

Only "I/O-to-memory" and "memory-to-I/O" transfers are allowed. "I/O-to-I/O" and "memory-to-memory" transfers are disallowed by the hardware configuration.

The system controller supports seven DMA channels, each with a page register used to extend the addressing range of the channel to 16 MB. The following table summarizes how the DMA channels are allocated.

DMA controller	
Channel	Function
0	Free
1	Free if not used for parallel port in Setup
2	Floppy disk controller
3	Free if not used for parallel port in Setup
4	Used to cascade DMA channels 0-3
5	Free
6	Free
7	Free

Interrupt Controllers

The Interrupt Requests (IRQs) are numbered sequentially, starting with the master controller, and followed by the slave.

Windows XP and Windows 2000	
IRQ (Interrupt Vector)	Interrupt Request Description
INTR	
ISA0	System Timer
ISA1	Standard 101/102-Key or Microsoft Natural PS/2 keyboard
ISA3	Communication Port (COM2)
ISA4	Communication Port (COM1)
ISA6	Standard Floppy Disk Controller
ISA8	System CMOS/real time clock
ISA9	Microsoft ACPI-Compliant System
ISA12	PS/2 Compatible Mouse
ISA13	Numeric data processor
ISA14	Primary IDE Channel
ISA15	Secondary IDE Channel
PCI5	Intel(R) 82801BA/BAM SMBus Controller - 2443
PCI17	Intel(R) 82801BA/BAM AC'97 Audio Controller - 2445
PCI19	Intel(R) 82801BA/BAM USB Universal Host Controller - 2442
PCI20	Intel(R) PRO/100 VE Network Connection
PCI 23	Intel(R) 82801BA/BAM USB Universal Host Controller - 2444

PCI Interrupt Request Lines

PCI devices generate interrupt requests using up to eight PCI interrupt request lines. PCI interrupts can be shared; several devices can use the same interrupt. However, optimal system performance is reached when minimizing the sharing of interrupts.

		Devices								
		AGP	PCI1	PCI2	PCI3	AC97	Internal LAN	USB controller 1	USB controller 2	SMBus
Chipset PCI INT lines	PIRQA	INTA			INTC					
	PIRQB	INTB			INTD	✓				✓
	PIRQC				INTA					
	PIRQD				INTB			✓		
	PIRQE		INTD	INTC			✓			
	PIRQF		INTA	INTD						
	PIRQG		INTB	INTA						
	PIRQH		INTC	INTB					✓	

POST Tests

The POST is executed each time the system is powered on, or a reset is performed. The POST process verifies the basic functionality of the system components and initializes certain system parameters.

The POST starts by displaying a graphic screen of the Hewlett-Packard logo when the PC is started.

Devices, such as memory and newly installed hard disks, are configured automatically. The user is not requested to confirm the change. Newly removed hard disks are detected, and the user is prompted to confirm the new configuration by pressing **F4**.

NOTE   The POST does not detect when a hard disk drive has been otherwise changed.

During the POST, the BIOS and other ROM data is copied into high-speed shadow RAM. The shadow RAM is addressed at the same physical location as the original ROM in a manner which is completely transparent to applications. It therefore appears to behave as very fast ROM. This technique provides faster access to the system BIOS firmware.

The following table lists the POST checkpoint codes written at the start of each test:

Checkpoint Code	POST Routine Description
D0	NMI is Disabled. CPU ID saved. Init code Checksum verification starting.
D1	To do DMA init, Keyboard controller BAT test, start memory refresh and going to 4GB flat mode.
D3	To start Memory sizing.
D4	To comeback to real mode. Execute OEM patch. Set stack.
D5	E000 ROM enabled. Init code is copied to segment 0 and control to be transferred to segment 0.
D6	Control is in segment 0. To check **<CTRL><HOME>** key and verify main BIOS checksum. If either **<CTRL><HOME>** is pressed or main BIOS checksum is bad, go to check point E0 else go to check point D7.
D7	To pass control to Interface Module.
D8	Main BIOS runtime code is to be decompressed.
D9	Control to be passed to main BIOS in shadow RAM. Boot Block Recovery Code Check Points.
E0	OnBoard Floppy Controller (if any) is initialized. To start base 512K memory test.
E1	To initialize interrupt vector table.
E2	To initialize DMA and interrupt controllers.
E6	To enable floppy and timer IRQ, enable internal cache.
ED	Initialize floppy drive.
EE	Start looking for a diskette in drive A: and read 1st sector of the diskette.
EF	Floppy read error.
F0	Start searching 'AMIBOOT.ROM' file in root directory.
F1	'AMIBOOT.ROM' file not present in root directory.
F2	Start reading FAT table and analyze FAT to find the clusters occupied by 'AMIBOOT.ROM' file.
F3	Start reading 'AMIBOOT.ROM' file cluster by cluster.
F4	'AMIBOOT.ROM' file not of proper size.
F5	Disable internal cache.
FB	Detect Flash type present.

Checkpoint Code	POST Routine Description
FC	Erase Flash.
FD	Program Flash.
FF	Flash program successful. BIOS is going to restart. Runtime code is uncompressed in F000 shadow ram.
03	NMI is Disabled. To check soft reset/power-on.
05	BIOS stack set. Going to disable Cache if any.
06	POST code to be uncompressed.
07	CPU init and CPU data area init to be done.
08	CMOS checksum calculation to be done next.
0B	Any initialization before keyboard BAT to be done next.
0C	KB controller I/B free. To issue the BAT command to keyboard controller.
0E	Any initialization after KB controller BAT to be done next.
0F	Keyboard command byte to be written.
10	Going to issue Pin-23,24 blocking/unblocking command.
11	Going to check pressing of **<INS>**, **<END>** key during power-on.
12	To init CMOS if "Init CMOS in every boot" is set or **<END>** key is pressed. Going to disable DMA and Interrupt controllers.
13	Video display is disabled and port-B is initialized. Chipset init about to begin.
14	8254 timer test about to start.
19	About to start memory refresh test.
1A	Memory Refresh line is toggling. Going to check 15us ON/OFF time.
23	To read 8042 input port and disable Megakey GreenPC feature. Make BIOS code segment writeable.
24	To do any setup before Int vector init.
25	Interrupt vector initialization about to begin. To clear password if necessary.
27	Any initialization before setting video mode to be done.
28	Going for monochrome mode and color mode setting.
2A	Different BUSes init (system, static, output devices) to start if present.
2B	To give control for any setup required before optional video ROM check.
2C	To look for optional video ROM and give control.
2D	To give control to do any processing after video ROM returns control.
2E	If EGA/VGA not found then do display memory R/W test.
2F	EGA/VGA not found. Display memory R/W test about to begin.
30	Display memory R/W test passed. About to look for the retrace checking.
31	Display memory R/W test or retrace checking failed. To do alternate Display memory R/W test.
32	Alternate Display memory R/W test passed. To look for the alternate display retrace checking.
34	Video display checking over. Display mode to be set next.
37	Display mode set. Going to display the power on message.
38	Different BUSes init (input, IPL, general devices) to start if present.
39	Display different BUSes initialization error messages.
3A	New cursor position read and saved. To display the Hit **<DEL>** message.
40	To prepare the descriptor tables.

Checkpoint Code	POST Routine Description
42	To enter in virtual mode for memory test.
43	To enable interrupts for diagnostics mode.
44	To initialize data to check memory wrap around at 0:0.
45	Data initialized. Going to check for memory wrap around at 0:0 and finding the total system memory size.
46	Memory wrap around test done. Memory size calculation over. About to go for writing patterns to test memory.
47	Pattern to be tested written in extended memory. Going to write patterns in base 640k memory.
48	Patterns written in base memory. Going to find out amount of memory below 1M memory.
49	Amount of memory below 1M found and verified. Going to find out amount of memory above 1M memory.
4B	Amount of memory above 1M found and verified. Check for soft reset and going to clear memory below 1M for soft reset. (If power on, go to check point# 4Eh.)
4C	Memory below 1M cleared. (SOFT RESET) Going to clear memory above 1M.
4D	Memory above 1M cleared. (SOFT RESET) Going to save the memory size. (Goto check point# 52h).
4E	Memory test started. (NOT SOFT RESET) About to display the first 64k memory size.
4F	Memory size display started. This will be updated during memory test. Going for sequential and random memory test.
50	Memory testing/initialization below 1M complete. Going to adjust displayed memory size for relocation/shadow.
51	Memory size display adjusted due to relocation/ shadow. Memory test above 1M to follow.
52	Memory testing/initialization above 1M complete. Going to save memory size information.
53	Memory size information is saved. CPU registers are saved. Going to enter in real mode.
54	Shutdown successful, CPU in real mode. Going to disable gate A20 line and disable parity/NMI.
57	A20 address line, parity/NMI disable successful. Going to adjust memory size depending on relocation/shadow.
58	Memory size adjusted for relocation/shadow. Going to clear Hit **<DEL>** message.
59	Hit **<DEL>** message cleared. **<WAIT...>** message displayed. About to start DMA and interrupt controller test.
60	DMA page register test passed. To do DMA#1 base register test.
62	DMA#1 base register test passed. To do DMA#2 base register test.
65	DMA#2 base register test passed. To program DMA unit 1 and 2.
66	DMA unit 1 and 2 programming over. To initialize 8259 interrupt controller.
7F	Extended NMI sources enabling is in progress.
80	Keyboard test started. clearing output buffer, checking for stuck key, to issue keyboard reset command.
81	Keyboard reset error/stuck key found. To issue keyboard controller interface test command.
82	Keyboard controller interface test over. To write command byte and init circular buffer.
83	Command byte written, Global data init done. To check for lock-key.
84	Lock-key checking over. To check for memory size mismatch with CMOS.
85	Memory size check done. To display soft error and check for password or bypass setup.
86	Password checked. About to do programming before setup.
87	Programming before setup complete. To uncompress SETUP code and execute CMOS setup.
88	Returned from CMOS setup program and screen is cleared. About to do programming after setup.
89	Programming after setup complete. Going to display power on screen message.
8B	First screen message displayed. **<WAIT...>** message displayed. PS/2 Mouse check and extended BIOS data area allocation to be done.
8C	Setup options programming after CMOS setup about to start.

Checkpoint Code	POST Routine Description
8D	Going for hard disk controller reset.
8F	Hard disk controller reset done. Floppy setup to be done next.
91	Floppy setup complete. Hard disk setup to be done next.
95	Init of different BUSes optional ROMs from C800 to start.
96	Going to do any init before C800 optional ROM control.
97	Any init before C800 optional ROM control is over. Optional ROM check and control will be done next.
98	Optional ROM control is done. About to give control to do any required processing after optional ROM returns control and enable external cache.
99	Any initialization required after optional ROM test over. Going to setup timer data area and printer base address.
9A	Return after setting timer and printer base address. Going to set the RS-232 base address.
9B	Returned after RS-232 base address. Going to do any initialization before Coprocessor test.
9C	Required initialization before Coprocessor is over. Going to initialize the Coprocessor next.
9D	Coprocessor initialized. Going to do any initialization after Coprocessor test.
9E	Initialization after Coprocessor test is complete. Going to check extd keyboard, keyboard ID and num-lock.
A2	Going to display any soft errors.
A3	Soft error display complete. Going to set keyboard typematic rate.
A4	Keyboard typematic rate set. To program memory wait states.
A5	Going to enable parity/NMI.
A7	NMI and parity enabled. Going to do any initialization required before giving control to optional ROM at E000.
A8	Initialization before E000 ROM control over. E000 ROM to get control next.
A9	Returned from E000 ROM control. Going to do any initialization required after E000 optional ROM control.
AA	Initialization after E000 optional ROM control is over. Going to display the system configuration.
AB	To build MP table if needed.
AC	To uncompress DMI data and execute DMI POST init.
B0	System configuration is displayed.
B1	Going to copy any code to specific area.
00	Copying of code to specific area done. Going to give control to INT-19 boot loader.

HP e-DiagTools Preboot Diagnostics (Beep Codes)

When your PC starts up, its BIOS performs a Power-on Self Test (POST) to test your hardware configuration for any problems. If a problem is detected during the POST, an error is displayed on your PC's monitor.

If, however, your PC is unable to display an error message (for example, when your graphics controller has failed), it will emit a buzzing sound. This is the e-DiagTools preboot diagnostic. In the event of a problem with your PC immediately after the buzzing sound, a series of beeps is emitted.

If you hear a series of beeps, you should count them as this will help you detect the cause of the problem.

Number of Beeps	Meaning
0	• If you hear the buzzing audio signal: system OK • No buzzing audio signal: no power, PC is unplugged, power supply is down or system board has failed.
1	Processor absent, not correctly connected or processor socket not closed
2	Power supply is in protected mode
3	No memory, bad memory modules, incompatible memory module
4	Graphics solution problem
5	PnP/PCI initialization problem
6	Corrupted BIOS. You need to activate crisis recovery procedure.
7	Defective system board

Note that for Memory (code 3), Video Card (code 4), and PnP/PCI (code 5) errors, e-DiagTools preboot diagnostic will only detect them after a 15-second timeout.

If you miss the beep code, turn off the PC. Then press the on/off power button for five seconds or more and listen for the signal again.

The e-DiagTools preboot diagnostics, as well as emitting a beep sequence, also encodes troubleshooting information (such as the PC model, serial number and failing components) into a coded audio signal. During a support call, this coded signal can then be decoded by the HP Service Provider to provide immediate and effective assistance.

4

Drivers and Software

This chapter describes the drivers and software preloaded with HP Vectra XE320 PCs.

Drivers

You can download up-to-date versions of drivers required for XE320 PCs from the "Software and Drivers" section of HP's Vectra Support web site at:
www.hp.com/go/vectrasupport.

Software

XE320 models come preloaded with the following software. You can download the most up-to-date versions from the "Software and Drivers" section of HP's Vectra Support web site at:
www.hp.com/go/vectrasupport.

Operating System

- Windows XP Professional Edition (downgradeable to Windows 2000 with recovery CD)
- Windows XP Home Edition.

Software

- HP Image Creation and Recovery CD-ROM (OS installation and hard disk preparation)
- HP Image Library and Diagnostics CD-ROM (drivers and utilities installation as well as diagnostics).

e-DiagTools

HP e-Diagtools, the hardware diagnostics utility can help you diagnose hardware-related problems on your HP PC. For more information about this utility, refer to the e-Diagtools User's Guide. The e-Diagtools User's Guide is available on the HP Information CD-ROM for the XE320, or on HP's Vectra Support web site (**www.hp.com/go/vectrasupport**).

e-Diagtools is installed on the Utility Partition on the PC's hard disk drive, is provided on one of the CD-ROMS that came with the PC (HP Image Library and Diagnostics System CD-ROM), and is available on the HP e-Diagtools CD (you can order this CD-ROM from HP's Vectra Support web site).

BIOS Updates

The system BIOS is identified by the version number JN.xx.yy. The latest BIOS version for your PC and instructions for updating the BIOS can be downloaded from the HP Vectra Support Web site at:
www.hp.com/go/vectrasupport.

The Technical Reference Manual contains the following
documents downloadable from the web site
www.hp.com/go/support in PDF format:

- Introduction & HP Business PC Overview
  Describes how to use the Technical Reference Manual and
  provides a brief overview of the most recent HP Business PCs.

- Product Description
  The document you are reading. One manual is provided for
  each HP Business PC. Each manual provides detailed BIOS
  information and summary information on the hardware
  components in the HP PC.

- HP Business PC Technology
  A detailed look at the hardware components in the latest HP
  Business PCs. Includes information on processors, chip-sets,
  graphic controllers, network interfaces, connectors and
  sockets.